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FLAVOR IMPROVEMENT FOR FROZEN SWEETS
[Reika no fu-mi kaizen ho-ho]

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1. Title

Flavor Improvement Method for Frozen Sweets

2. Claims

(1) A flavor improvement method for frozen sweets which use butterfat is characterized by the fact that cyclodextrin is added to butter and/or butter oil as butterfat ingredients.

(2) The flavor improvement method described in Claim (1) is the clathration of the butter flavor with cyclodextrin.

(3) The flavor improvement method for frozen sweets described in Claim 1 or 2 adds 0.5 to 10 weight% of cyclodextrin to butter and/or butter oil.

(4) The flavor improvement method for frozen sweets described in any of Claims 1 through 3 adds 0.5 to 10 weight% of cyclodextrin to butter and/or butter oil, then adds water in the amount of 0.5 to 10 times of the amount of cyclodextrin; the mixture is then stirred to form an emulsion.

3. Detailed Explanation of the Invention.

This invention pertains to a flavor improvement method for frozen sweets such as ice cream, iced milk, sherbet, popsicles and milk shakes; in specific it pertains to a flavor improvement method for frozen sweets, particularly those using butterfat, which aims to remove malodor of butter flavor by the addition of cyclodextrin and

* Numbers in the margin indicate pagination in the foreign text.

to improve meltability in the mouth.

In the past, for frozen sweets such as ice cream, iced milk and the like, as the butterfat ingredients, milk, fresh cream, butter, condensed milk and the like were used. These butterfat ingredients are considerably poor in terms of preservability. Accordingly, as substitutes for these, butter oil which has good preservability has been considered, but the butter oil has a peculiar flavor; moreover, when it is used in frozen sweets, it has a shortcoming such that it worsens meltability in the mouth. Hence, the use of butter oil in frozen sweets has problems in terms of flavor and taste. Also, even /186 ordinary butter has a smell peculiar to butter, and when it is used in frozen sweets, it has the same problems in terms of flavor and taste as those of the butter oil. There has been a need for improvement in flavor.

On the other hand, it is known that cyclodextrin, which is obtained by the hydrolysis of starch, includes various compounds, generating stable clathrate compounds; its use in the medical fields or in certain kinds of foods has been proposed. However, it is not known whether cyclodextrin, when used in frozen sweets such as ice cream, ice milk and the like, will not only block malodor but also improve meltability in the mouth.

In this specification, "meltability in the mouth" is used to indicate the properties of frozen sweets, such as when frozen sweets such as ice cream are eaten, how it melts in the mouth, in other

words (1) if it melts smoothly, (2) if there is a feeling as if a film is formed in the mouth, and (3) if there is a gluey condition, etc.

The inventor, et al., as a result of numerous studies using cyclodextrin to remove the smell unique to butter and butter oil in frozen sweets, identified that if a specific amount of cyclodextrin is added to butter and butter oil as butterfat ingredients so as to generate the clathrate compounds, frozen sweets made of these butterfat ingredients such as ice cream, ice milk, sherbet, popsicles, milk shakes and the like not only have no peculiar malodor caused by butter and butter oil but also have drastically improved meltability in the mouth.

Accordingly, the general purpose of this invention is, by adding cyclodextrin to the butterfat ingredients, to remove the odor peculiar to frozen sweets which use butterfat as well as to improve meltability in the mouth.

The main purpose of this invention is to provide a flavor improving method for frozen sweets using butterfat, which is characterized by the fact that cyclodextrin has been added to the butter and/or butter oil as the butterfat ingredients.

As clarified in the above description, in this invention, the flavor improvement includes not only the improvement of flavor but also the improvement of meltability in the mouth. Also, the frozen sweets in this invention include various frozen sweets, semi-frozen sweets and frozen liquid sweets which use butterfat such as ice

cream, iced milk, sherbet, popsicles, milk shakes and the like.

The cyclodextrin used in this invention's flavor improvement method for frozen sweets is called by an alias, cycloamylose or Schardinger dextrin, and is obtained by having cyclodextrin trans-glycosirase, which is an enzyme produced by bacillus-macerans, act on starch, or having alkali amylase, which is produced by a specific bacillus genus's strain, act on starch; three kinds of cyclodextrins, which are α -type, β -type and γ -type, are known. The manufacturing methods of these cyclodextrins are detailed in the paper by E.B. Tilden and C. B. Hudson (Journal American Chemical Society, 64, 1432 (1942)), the paper by D. French (Journal American Chemical Society, 71, 353(1949)) or the Publication of Unexamined Patent Application, Kokai Number S49-117691. In this invention's method, any one of α -type, β -type or γ -type dextrin can be used.

The amount of cyclodextrin used in this invention's method is 0.5 to 10 weight% to butter and/or butter oil, preferably 1 to 6 weight%, and about 5 weight% is especially preferable.

Also, in a proper concrete example of this invention, first the said specific amount of cyclodextrin is added to the butter and/or butter oil; then water in the amount of about 0.5 to 10 times of the amount of cyclodextrin is added; this is then mixed and stirred to emulsify, forming an emulsion of butter and/or butter oil, cyclodextrin and water; this emulsion can be used as the butterfat

ingredient to produce frozen sweets by a regular method.

The fact that the odor unique to butter and butter oil is /187 removed by this invention's method is because cyclodextrin includes butter flavor, forming a stable and odorless clathrate compound; and the fact that a desirable and good meltability in the mouth for frozen sweets can be obtained is because butter and butter oil and water are formed into a stable emulsion via cyclodextrin. Regardless, according to this invention's method, it is possible to obtain frozen sweets which have improved flavor and good meltability in the mouth without the odor of butter.

This invention is further explained referring to examples. However, this invention is not limited to these examples.

[Example 1]

Butter oil	500g
Cyclodextrin	25g
Water	200g
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Total	725g

The above 3 kinds of ingredients in the said amounts were put into a cup and mixed at 45°C for 5 minutes by a homogenizer, forming an emulsion; then this emulsion was refrigerated for 24 hours.

Using this product according to the following recipe, ice cream was prepared by an ordinary method.

The said product	232g
Skim powdered milk	180g
Sugar	260g
Corn syrup	100g
Emulsifier	4g
Stabilizer	4g
Coloring agent	proper amount
Essence	proper amount
Water	1,220g
	<hr/> 2,000g

The ice cream thus prepared was compared to ice cream which was prepared without using cyclodextrin by a sensory test conducted by ten panel members. The sensory test was conducted by a method to choose and encircle a product which has no odor of butter and is distinctive in its meltability in the mouth. The results obtained are shown in the following Table 1.

Table 1

Panel Sample	1	2	3	4	5	6	7	8	9	10	Total
Control					o				o		2
Product of Example 1	o	o	o	o		o	o	o		o	8

As clarified by the results shown in Table 1, the ice cream which used butter oil with added cyclodextrin as the butterfat ingredient had the overall improved taste of both the flavor and meltability in the mouth in comparison with the control's ice cream which did not use cyclodextrin.

[Example 2]

Butter	600g
Cyclodextrin	30g
Water	100g
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Total	730g

The above three kinds of ingredients in the said amounts were mixed at 35°C for 1 minute by a mixer; this mixture was refrigerated; then using this mixture according to the following recipe an ice milk was prepared by an ordinary method.

The said product	122g
Vegetable fat	40g
Skim powdered milk	160g
Sugar	260g
Corn syrup	100g
Emulsifier	4g
Stabilizer	4g
Coloring agent	proper amount
Essence	proper amount
Water	1,310g
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	2,000g

The ice milk thus prepared was compared to the ice milk which was prepared without using cyclodextrin by a sensory test conducted by ten panel members. The sensory test was conducted by a method to choose and encircle a product which has no odor of butter and is distinctive in its meltability in the mouth. The results obtained are shown in the following Table 2.

Table 2

Panel Sample	1	2	3	4	5	6	7	8	9	10	Total
Control		o				o			o		3
Product of Example 2	o		o	o	o		o	o		o	7

As clarified by the results shown in Table 2, the ice milk which used butter with added cyclodextrin as the butterfat ingredient has the overall improved taste in both the flavor and meltability in the mouth in comparison with the control's ice milk which did not use cyclodextrin.